With the Publishers

AILWAY Engineering and Maintenance of Way enters the year of 1907 with greater promise than ever before. Its growth has been more than our hope led us to expect. When we founded Railway Engineering we firmly believed there was a field for a railway journal wholly devoted to railway engineering and maintenance of way and our success has justified and proved this belief. There are a number of railway journals, one devoted entirely to the mechanical department and others attempting to cover the entire railway field, but our belief in the plan of giving a railroad official a paper covering only the subjects in his department, which we have followed most successfully in the Railway Master Mechanic, led us to establish Railway Engineering. In this field we have tried to give the chief engineer, the engineer of maintenance of way, the superintendent of bridges and buildings, the signal engineer, the roadmaster and the track foreman, the news of all that is interesting each month and to discuss those features of engineering in a way that appeals to the man doing the work.

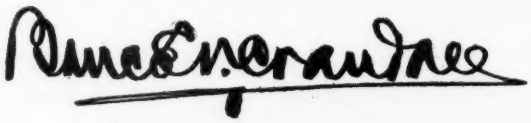
We know we have a field here as broad or broader than any other technical subject. There are thousands of miles of track in this country with ever changing conditions and new questions arising continually and new

devices constantly being invented and employed, which need to be told about and discussed in this journal. This is the object and policy of Railway Engineering and while, as we have said, our success is more than gratifying we want, not only to continue it, but to increase and surpass it. We want you, our readers, who have shown your confidence in us to work with us with the object of our common good. We desire the latest news in all that pertains to track, maintenance and engineering. There is not one of you who reads this, but who from time to time sees things and conditions on your railroad that would be of interest to other railroad men. If you will send such items to us, told in your own language, we shall be glad to have them and publish them. It is this kind of news we want and you can help us get it.

We have strengthened our organization and we are in better position than ever before to give all that is best to you in this journal at a nominal cost. We know it is worth more than it costs you for we are building a journal that is for all time, and a newspaper in the process of making is like a railroad in the building--the cost is far out of proportion to the income.

We are not trying to make you believe this is philanthropy--it is business. We believe in selling a newspaper as merchandise is sold by honest merchants --on the "satisfaction or money back" basis and we want to give even a little more than your money's worth to be sure you will be satisfied.

We ask you to consider this and to watch us grow.



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and Maintenance of Way

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Contents

The Railway Clubs 3
Co-operation Among Departments 3
Description of Exhibits During Convention 4
Queries and Answers 4
The Salisbury Wreck 4
Maintenance and Operation of Signaling Apparatus 5
Signaling Installation in New Terminal Station at Washington 5
Roundhouse with Concrete Roof Construction 6
Progress in Track Construction 10
Elevation of Traveling Cranes with Jacks 12
New Design of Buhrer Steel Tie 13
Recent Increase in Wages 14
Cast Steel Bumping Post 15
Concrete Bridge over Big Creek 16
Subjects for 1907 Convention of the Roadmasters and Maintenance of Way Association 16
New Bumping Post, Hoboken Terminal, D., L. & W. Road .. 17
Personal 17
The Monarch Wrench 18

The Railway Clubs

THE inestimable value of the work accomplished by railroad clubs in the advancement and progress of American railways is hardly appreciated by the railway companies. At the meetings of these organizations of railway officials, both superior and subordinate, the opportunity is presented for the exchange of ideas among representatives of different roads and among representatives of different departments of the same road. By such an exchange of ideas each member is educated along lines with which he may not be intimately associated, and also has his attention called to some item pertaining to his own department which had failed to come to notice under his own personal experience. While railway clubs originally considered subjects relating to the mechanical side of railway work, there is now a greater tendency to discuss subjects of interest to all departments and this fact should appeal to all railway officials, thereby attracting to the meetings those men who have heretofore remained away on the plea that the questions under deliberation were not in their line and therefore of no interest to them personally.

Co-Operation Among Departments

CO-OPERATION among the several departments of railroads has never been more essential than under existing conditions of railway maintenance and operation. This is especially noticeable in consideration of the increasing weight of motive power and rolling equipment and the consequent effect upon track, bridges, etc. In order that one may be designed and operated to meet, as far as possible, the demands of the other, the considerations affecting both the maintenance of way and mechanical departments might well be taken up mutually by representatives of both departments. Heavy rolling equipment has come to stay and every indication points to a continued increase in weight of the same to meet the demands of increased traffic. In order to maintain this heavy equipment and be prepared to continue successfully with increasing weight of the future, the track must receive due attention as it is an important factor offering limitations to the increasing dimensions of locomotives and cars. Heavy rolling equipment is necessarily severe upon track, roadbed and bridges and while the maintenance of track does not come under the jurisdiction of mechanical officials, nevertheless they can to a certain extent reduce the severity upon track equipment by following such designs likely to impose the least abuse upon the track and it is exceedingly advantageous to the railroad company for mechanical officers to use such judgment. The question of economy deciding the use of heavy engines and the addition of pushers to get over ruling grades or the improvement of grades and alignment, is a matter to be settled by the higher officials, however joint reports from mechanical and maintenance of way officials would greatly facilitate the solution of the problem.

Description of Exhibits During Convention

A NEW and pleasing feature which developed during the recent convention of the Roadmasters' and Maintenance of Way Association was the invitation issued to supply men who were exhibiting their specialties in an adjacent hall, to address the association at the close of one of the regular sessions, describing the merits of their various exhibits. Five minutes were given each exhibitor to do this, and it must be said that the members of the Roadmasters' Association showed splendid tact by remaining in the hall and listening to the large number of these addresses.

This action on the part of the roadmasters establishes a precedent which is well worth the imitation by other associations. When it is remembered that these conventions are for the sole purpose of keeping the members informed upon current methods of doing work, it stands to reason that the implements and materials used to do such work are of vital interest as well. This is what makes the exhibits of supplies so important and gives them a considerable educational value.

The association of supply men approved this action in no uncertain terms and consider this the beginning of a new departure which might well be adopted by other similar associations.

Queries and Answers

RAILWAY Engineering and Maintenance of Way is the journal of the chief engineer, the maintenance of way engineer, the roadmaster, the supervisor, the superintendent of bridges and buildings, the foremen of track, bridges and buildings, etc. It aims to present to these readers in each issue topics in which they are especially interested, and as having especial relation to their work. In order to present such matter in the best way possible this journal has upon its staff some of the best engineers and maintenance of way authorities, who make periodical contributions to its columns.

In order to make our readers feel that we are looking out for their interests, we desire to announce that beginning with the January, 1907 issue, we shall maintain a Department of Queries and Answers. Any subscriber may feel free to make use of that column and we shall be pleased to publish such inquiries and answers thereto. If such inquirer does not desire to have his name appear in print he may write over a nom de plume (always give your name, however, to the Editor). Such inquiries should have for their subject some maintenance of way matter or some allied subject. While at this subject, we desire further to call the attention of our readers that we want letters from them giving their methods of doing work, their experience with certain kinds of tools and implements, and in fact, any kind of information which will be of use to the craft.

There is nothing which is of greater help to a practical man than the experience of some other man in the same line of business, especially if such experience is of recent date. It enables him to compare notes and to experiment along a different line from what he has been used to. He may find the new way better or he may find it not as good as his own; if he finds it faulty, it is his duty to inform our readers of it, giving specified reasons. In this way the service is bound to be improved all around and every reader will be benefitted.

The Salisbury Wreck

THE official report of the fatal railway accident at Salisbury, England, on July 1st, 1906, recently made public, is a very interesting document, and shows that the cause of the wreck was excessive speed over a portion of track where a limit order had been issued. Incidentally, the report shows a number of peculiarities of the English railway service. It appears there was a curve of 1,200 feet radius (or about 4¾ degrees) at the west end of the platform near which the accident occurred, and one at the east end of 660 radius (about 8¾ degrees), and immediately east of this curve at the Fisherton Street bridge there is a cross over (probably a slip switch crossing) with a reverse curve of 495 feet radius (about 11½ degrees); this latter curve had no elevation whatever, on account of being a short reverse curve. The accident took place on the 8¾ degree curve having a maximum elevation of the outer rail of only 3½ inches. It is easily seen that a train traveling at a speed of 60 miles per hour would get into trouble on such a sharp curve provided with such moderate elevation. The high centrifugal force due to a speed of 60 miles per hour and a radius of 660 feet was sufficient to throw the engine off the track. The blame rests on the engineer of the fated train for not reducing the speed down to 30 miles per hour as called for in the regulation.

From the viewpoint of the American the question would no doubt be asked: If the local conditions in this case were such as to make the reduction in speed absolutely necessary to insure safety, why had no efforts been made to improve these conditions by reducing the degrees of curvature? Or, why was the elevation of the curve not increased to a permissible maximum of say 6 inches? If the latter had been done it might have prevented the accident. Again, it seems that the curves had not been adjusted by proper easement at their ends. This feature is now considered so important on all American trunk lines that even curves of very moderate sharpness, say from 2 to 3 degrees, are merged into tangents with carefully laid out spirals.

The Salisbury wreck points out a very important moral in railway operation: this is that too much reliance should not be placed in the personal integrity of an employe, for every human being is liable to forget orders. On the other hand if the roadway and track had been adjusted for high speed by reducing and compensating the sharp curvature and giving them proper elevation, it is reasonable to assume that the distressing accident would not have happened.

Maintenance and Operation of Signaling Apparatus

RELIABLE, economical and satisfactory operation of any apparatus depends primarily and ultimately on *maintenance*—preservation in operating condition equal to its original state.

Strain, stress, impact; abrasion, corrosion, distortion, rot, all producing weakness, wearing away, disintegration and ultimate collapse, are in the hands of the maintainer.

"A stitch in time" is the thing. A stitch is taken "in time," before the necessity for it has become evident. A good needle and suitable thread are useful for the purpose but they must be in experienced hands to be efficient.

In the maintenance of signaling apparatus, tools and materials are of importance if the trained man is employed to use them. The trained man is, therefore, the first requisite. A sufficient training results only after hard, conscientious labor in the manufacture, erection and maintenance in service of the various signaling devices in use. Each kind has a bearing on the other and all cover an extensive field.

"Interlocking" apparatus is of kinds known as manually operated ("mechanical") and power operated. The former is, as its name implies, dependent entirely on human manipulation; the hand and muscle of man imparts the power. The latter is under manual control inasfar as the initial impulse is concerned but the movement of switches, locks, signals, etc., are imparted by the power of fluid or electric pressure suitably applied for the purpose.

The maintenance of a purely "mechanical" interlocking plant can better be accomplished by a man who has installed such apparatus than by one who has merely been "among those present" during its installation. It is obvious that the design, execution and purpose of the apparatus in all of its more or less intricate parts, coupled with its duties in service, call for no insignificant intelligence on the part of the maintainer. To determine when adjustment, repair and renewal of parts are requisite; to know just how and when to provide these; to do these things safely and at the least expense of time, materials and interruption to traffic, demand a man on the spot equipped for the job. But the most competent man must necessarily fail to accomplish anything to the purpose unless he is equipped with suitable tools and spare materials.

Locomotives render satisfactory service, keep up to their power and are ready for their runs day in and day out, year after year, only when they are inspected, groomed, repaired and adjusted by expert men under an experienced head. Roundhouses and repair shops, fitted and equipped with tools and materials are provided on every division of a railroad, with a mechanical superintendent and his staff assigned for this express purpose.

The telegraph department of a railroad is carried on under the charge of a Superintendent of Telegraph and a large staff of experienced men.

Within recent years signaling has become a distinct department on all important railroads and a signal engineer appointed with his staff of subordinates and their assistants whose whole duties are the erection, maintenance and repair of everything pertaining to signaling.

A supply of stores, tools, etc., is provided for their use and the same efficiency in service is now being derived from signaling apparatus that is given by the motive power and other departments similarly equipped.

Previously, when signaling was put in charge of one or more departments, each of which was already loaded with responsibilities, results in service were most unsatisfactory. No expert signalmen were employed and no sort of intelligent care given to apparatus which in most cases was allowed to go to ruin, fail to operate and finally fall out of service and become useless and without value. The operating department condemned it as well as the department under whose care it had been placed. The manufacturer was discredited and the advance of signaling became slow and precarious.

Once considered as a luxury—an exotic requiring infinite care and costing prohibitive prices—it remained for the progressive roads to place signaling in a distinct department under the superintendence and management of an engineer educated and expert in the science. He, with his staff of assistants; with a storehouse for repair parts and a shop for repairs, has shown that the very same apparatus which formally gave temporary and unsatisfactory results, now gives absolutely indispensable service, is kept in constantly successful operation, saving from accidents and expenditures an amount of money annually far in excess of all the investment covering first cost, the signal department, deterioration, repair and maintenance.

Signaling Installation in the New Terminal Station at Washington

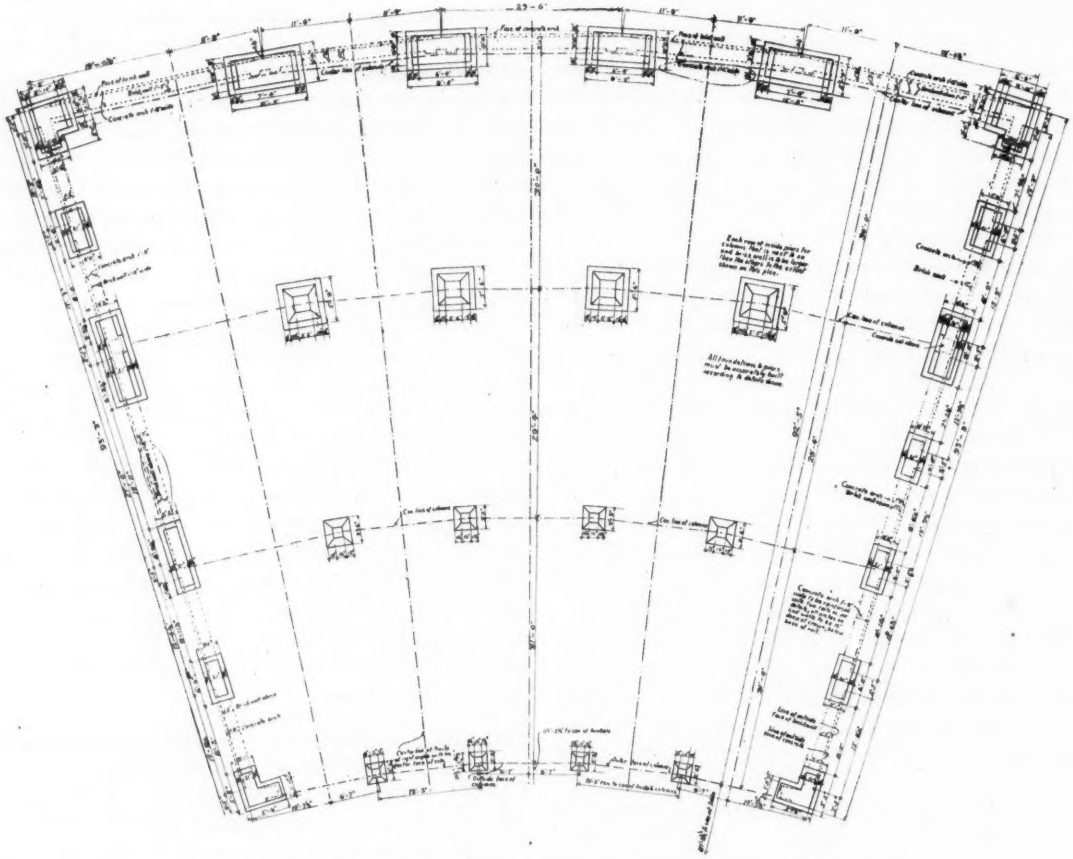
THE Union Switch & Signal Company, of Swissvale, has been awarded the entire contract for the interlocking and signalling of the great terminal station now being constructed in Washington, D. C., by the Pennsylvania and the Baltimore & Ohio Railroad Companies. The installation will be electro-pneumatic, similar in its general characteristics to that in the railway yards of the Pennsylvania Railroad at the Union Station in Pittsburg, Pa. The Washington installation, however, will be the largest and most complicated signalling and interlocking installation that has ever been constructed in the world. The largest one previous to this was put in service at St. Louis at the beginning of the World's Fair, and before that the most important was the electro-pneumatic interlocking system at the terminals of the Boston South Station. Both of these plants were also installed by the Union Switch & Signal Company.

Roundhouse With Concrete Roof Construction

Denver & Rio Grande R. R.

(Concluded from previous issue.)

THE roundhouse has a span of 92 feet 5 inches measuring from the center line of door columns to the outside face of the roundhouse wall. The distance from the center of the turn table to the center line of door columns is 117 feet 2½ inches. The inner bay is 31 feet wide between centers of columns, the intermediate bay is 29 feet 4 inches and the outside bay is 32 feet 1 inch, measuring from the center line of columns to outer face of wall.



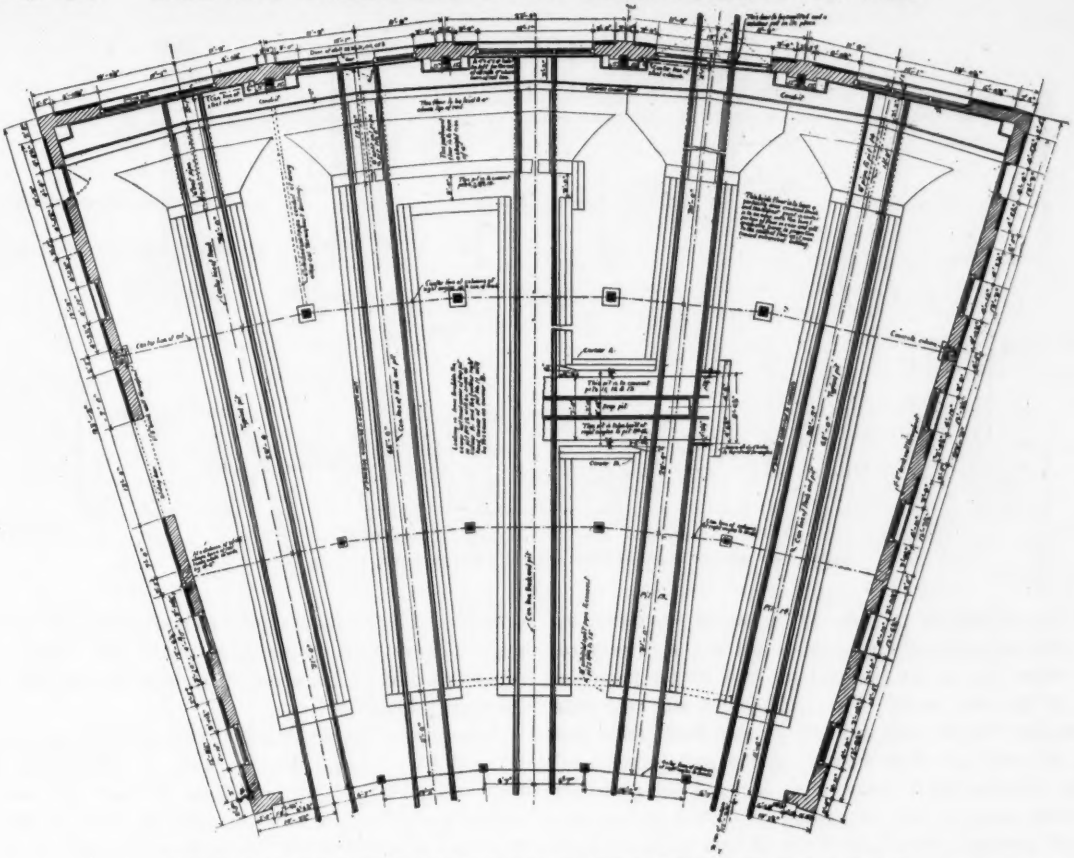
PART OF FOUNDATION PLAN—PUEBLO ROUNDHOUSE, D. & R. G. R. R.

The round house is served by an 80 foot turn table. The end walls of each section are well supplied with glass windows, a feature unusual in general round house construction. The outer wall is also well provided with large glass windows so that ample day lighting is provided throughout the round house.

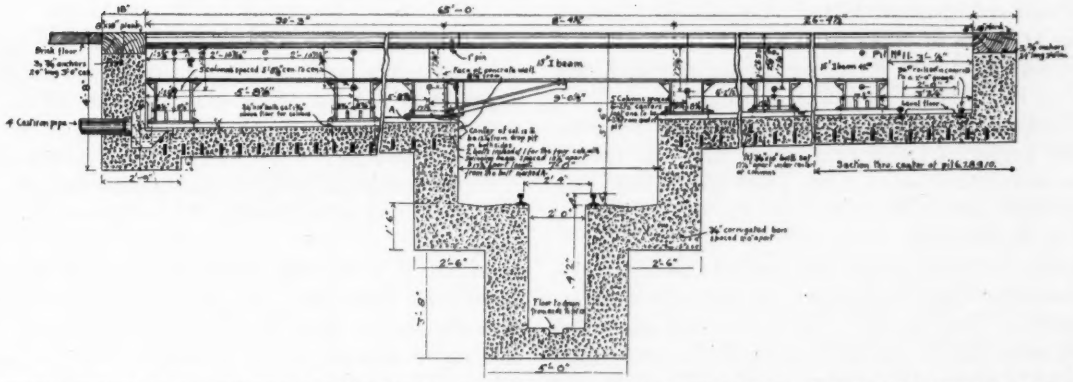
The walls of the round house are of brick, 1 foot 5 inches wide supported on concrete foundations 1 foot 9 inches wide. The outer circle of the round house is encircled by a concrete conduit for carrying steam, air and water pipes. These pipes, with the exception of the steam heat piping system, are led from conduit to columns between alternate pairs of pits by 6 inch vitrified pipe.

The locomotive repair pits are of novel construction. They are entirely of concrete, the side and end walls being 18 inches thick and the bottom of the pits being 14 inches thick. Longitudinally the pits incline towards the turn table having a drop of 6 inches in the length of the pit. They are 3 feet deep at the outer end and 2 feet 6 inches deep at the turn table end. Extending the full length of the pit is a gutter 8 inches wide by 2 inches deep. Transversely the bottom of the pit is level. The gutter drains to a pocket, or sump, in the turn table end of the pit and this in turn is drained by a 4 inch cast iron pipe connected with the sewer system.

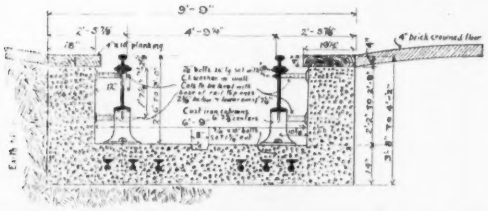
The walls of the pit are surmounted by planking 4 inches thick, this planking being provided for facility in jacking locomotives. The pit is 6 feet 9 inches wide between inside faces of wall. The rails are set to 4 feet 9¼ inch gauge and the inner face of the ball of each rail is 12 inches from the inner face of the side wall. The



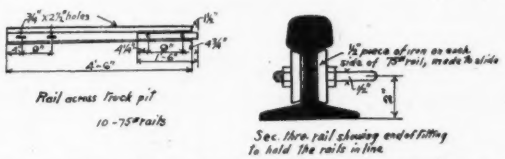
FLOOR PLAN OF HIGH PORTION INCLUDING DROP PIT—PUEBLO ROUNDHOUSE, D. & R. G. R. R.



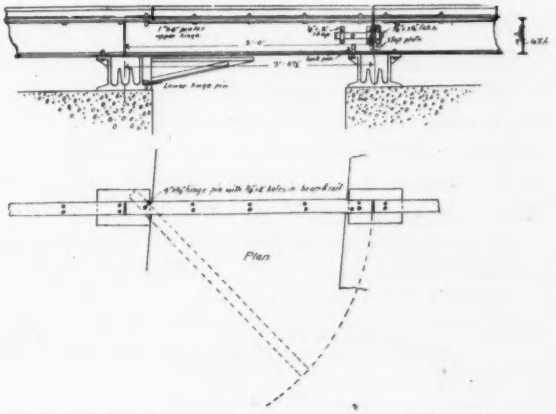
LONGITUDINAL SECTION OF PIT, INCLUDING SECTION TOWARD TURN TABLE, SECTION OF DRIVING WHEEL DROP PIT AND SECTION OF TRUCK DROP PIT—PUEBLO ROUNDHOUSE, D. & R. G. R. R.



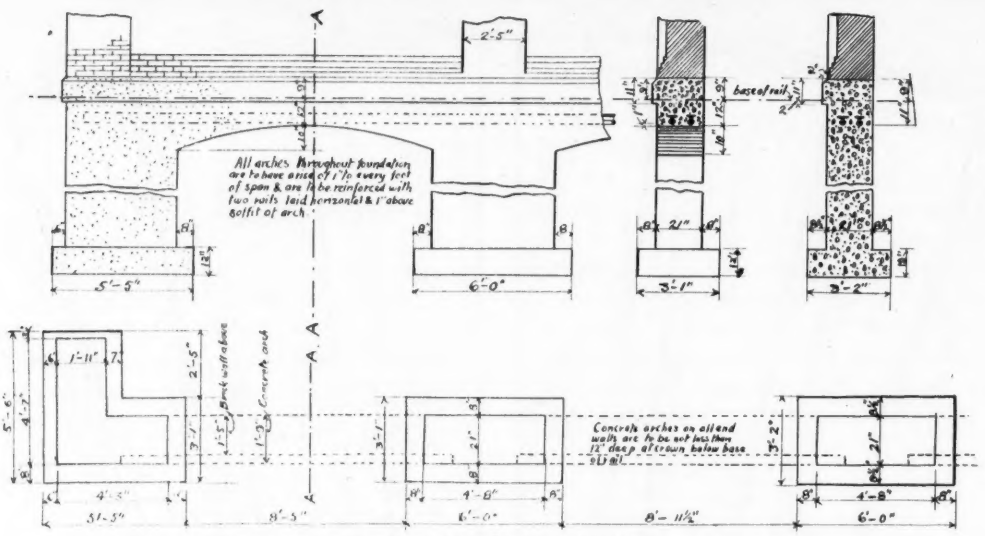
TRANSVERSE SECTION OF PIT—PUEBLO ROUNDHOUSE, D. & R. G. R. R.



METHOD OF SECURING DROP PIT RAILS—PUEBLO ROUNDHOUSE, D. & R. G. R. R.



PLAN AND ELEVATION OF SWINGING RAIL SPANNING DROP PIT—PUEBLO ROUNDHOUSE, D. & R. G. R. R.


All arches throughout foundation are to have area of 1" to every foot of span & are to be reinforced with two rails laid horizontal & 1" above soffit of arch
base of rail
Concrete arches on all end walls are to be not less than 12" deep at crown below base of rail
A
A

DETAILS OF CONCRETE FOUNDATION—PUEBLO ROUNDHOUSE, D. & R. G. R. R.

rails are carried on 15 inch, 42 lb. beams supported by cast iron pedestals arranged on 5 feet 8⅞ inch centers. The center line of the pedestals is 10⅝ inches from the face of the side walls. The iron beams and pedestals are anchored to the side walls by ⅞ inch bolts, 28 inches long, set with cast iron washers in the wall. Imbedded in the concrete floor immediately beneath the pedestals are three rows of rails extending the full length of the pit and arranged with balls down, to give greater rigidity to the foundation of the pedestals. These are 30 to 40 lb. rails arranged with broken joints, and no joints are within 24 inches of center of columns. These rails rest on ⅞ inch by 4 inch scrap bars arranged transversely with the length of the pit and on 8 inch centers.

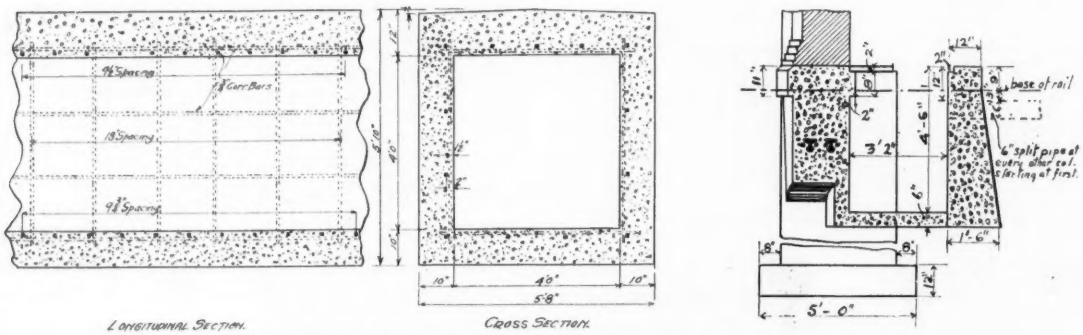
To support the planking surmounting the pit walls, beveled sleepers 4 inches by 4 inches flush with the top of the concrete are laid on 3 foot 2 inch centers and under every fourth sleeper is placed a vertical piece flush with face of the concrete.

Pits No. 11, 12 and 13 are connected by a pit drop which is arranged at right angles to pit No. 12, the drop pit being built on straight lines. The tracks and supporting beams spanning the drop pit are arranged to swing from one end as shown in the plan drawing illustrating the drop pits. This method applies to both rails of the central pit and inner rails of the outer pits. The outside rails of pits 11 and 13 are arranged to slide to one side as is common practice.

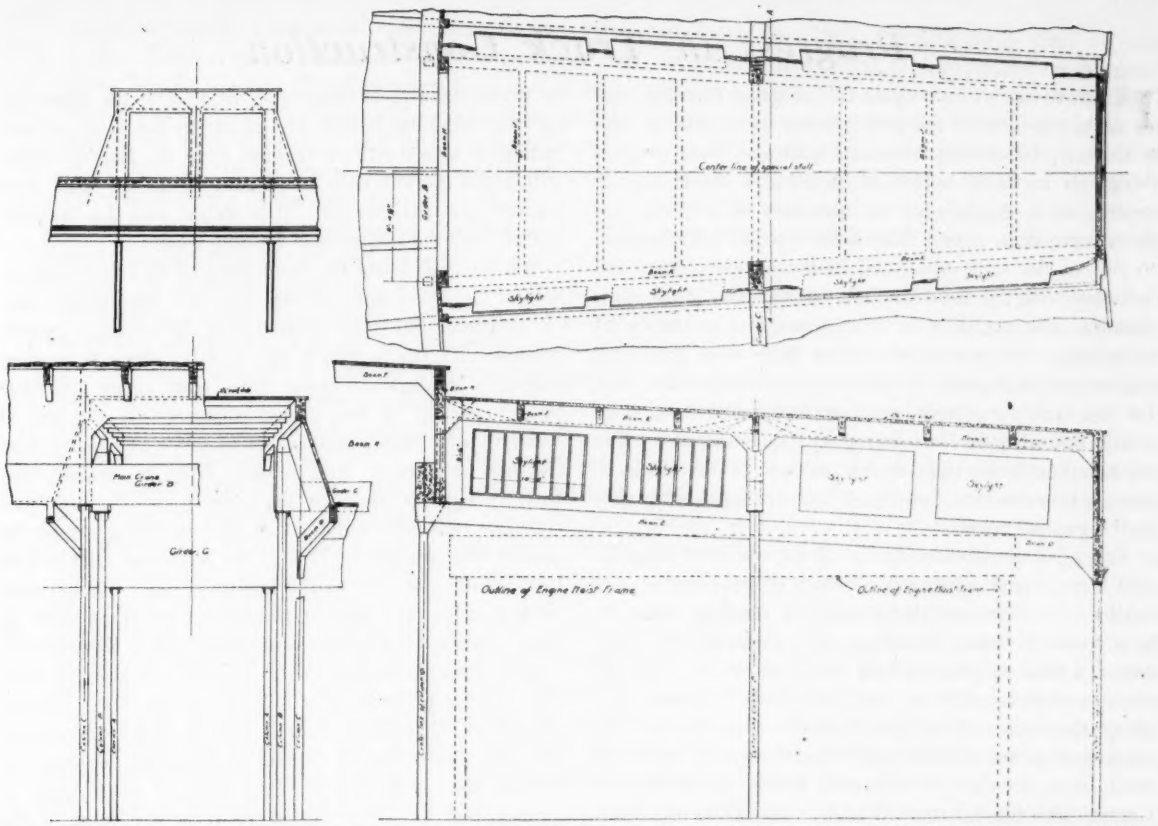
A portion of the pit wall at the juncture of the erecting pit and the drop pit are cut away as shown to allow beams to swing. Two iron slabs ½ inch wide and 18 inches long and arranged on opposite sides of the rail web, are used to secure the rails in position when the spanning tracks are in line. Details of this device are shown in the accompanying line drawing.

The rails for the transfer of the drop pit jack are set on 2 feet 4 inch gauge. The top of these rails is 5 feet 6 inches below the top of the pit rails. The pit for the jack cylinder is 4 feet 6 inches below the top of the jack rail. The drop pit is 7 feet wide. The pit is of concrete of similar construction to the erecting pits. Jacks for the driving wheels and truck drop pits are operated by compressed air.

Pits No. 6, 7, 8, 9 and 10 are arranged with drop pits for moving engine truck wheels and the pit connected with the several stalls is constructed on circular lines on a radius with the center of the turn table as a center. The rails for the transfer carriage are imbedded in con-



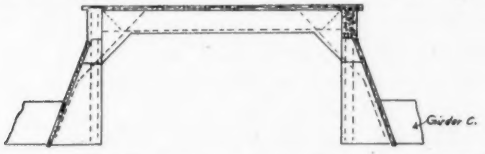
SECTIONS OF CONDUIT—PUEBLO ROUNDHOUSE, D. & R. G. R. R.



CROSS SECTION OF STALL, PLAN OF ROOF OVER ENGINE HOIST, ELEVATION AND END OF STALL LOOKING TOWARDS TURN TABLE AND LONGITUDINAL SECTION THROUGH STALL, INCLUDING ENGINE HOIST FRAME—BURNHAM ROUNDHOUSE, D. & R. G. R. R.

crete and are set on a 2 foot gauge. In the accompanying line drawing is shown the longitudinal section of the erecting pit. The cross sections of the driving wheel pit and engine truck wheel pit are shown in the same drawing.

The roundhouse is heated by direct steam radiation. Steam is supplied from the power house and the steam connections are led around the inside of the outer wall of the house through the concrete conduit and from this conduit supply pipes are led through short vitrified pipe conduits to the steam coils. The coils are arranged on



SECTION A A, SHOWING RODS AND BEAMS — BURNHAM ROUNDHOUSE, D. & R. G. R. R.

the walls of the pits outside of the pedestal and beams supporting the rails so that they are entirely protected from damage, and heat from the coils rises between the wood coping and the rail.

Artificial light is provided by incandescent electric lamps placed on the outer wall and on each column, stationary and extension sockets being provided in every case. Feed wires are run around the top of the columns and under the crane girders along the outer wall. Iron conduits are provided for connection to the sockets and the sockets are arranged at a height of about 7 feet from the floor.

The round house floor is of brick and has a perfectly even finish. The highest point in the center is even with the level portion of the floor in the rear of the house and gradually lowers in proportion as it extends towards the end of the building.

In the construction of girders, beams, etc., expanded metal of 10 inch gauge and 3 inch mesh is used. The rods used in connection with this construction are the St. Louis Expanded Metal Company's corrugated bars. The concrete is one part cement, three parts sand and six parts stone. The roof slabs are 2½ inches thick of a composition averaging about one part cement, two parts sand and four to five parts of broken stone and fine gravel.

At Burnham, a suburb of Denver, a roundhouse is being erected which is practically of the same construction as the high section of the Pueblo house. However, at Denver there are 30 covered stalls. The roof of one stall over the inner bays of the house is raised to provide for the care of a locomotive hoist. The radius of the inner circle of the Burnham house is 141 feet 5 inches instead of 117 feet 2½ inches as at Pueblo.

For the illustrations presented, we acknowledge the courtesy of Mr. J. R. Groves, past superintendent of motive power and car department, and Mr. Arthur Ridgway, acting engineer of bridges and buildings.

Progress in Track Construction

IF ONE was to investigate the progress in track construction during the past quarter of a century with a view to discovering radical departures from original design or methods, he would have but a short story to write, for it would only be necessary to explain that there have been none. The same type of rail, fastened to ties of the same kind, and in the same manner, and ballasted with the same kind of material, and in the same manner, that are now in service, were in existence 25 years ago. It is true that there have been important improvements in many details of track construction, but, for the most part, these have been developed along ideas which had already been introduced 25 years ago. The information to be had on this subject is, therefore, of more interest to the student of railway engineering than to the general reader.

Taking the question up in detail, we will consider first the roadbed construction, which is synonymous with earthwork. The machinery used in roadbed construction, such as steam shovels, is now generally of larger capacity than was the case 25 or 30 years ago. At that time excavators with one-yard or 1½-yard dippers were about the limit. Now 3 to 3½-yard dippers are common, and steam shovels with 5-yard dippers are being used on a number of railroads, as on the Wisconsin Central and the Southern Pacific. So far as the roadbed itself is concerned, about the only improvements is in the specification of larger dimensions. Years of experience have shown that roadbed of width which will merely permit the track to be ballasted will not stand up under service for many years, in the case of embankments, or afford sufficient drainage where track is constructed through cuts. A large mileage of track was formerly constructed on roadbed 12 feet wide, on embankments, and but little wider in cuts. Sixteen feet is now considered about the minimum allowable limit for roadbed on embankments, and 18 feet is none too much, when we consider the washing effect of rains. In order to properly support the ties there must be a good width of shoulder to hold the ballast. In cuts, the ditches should be well removed from the ends of the ties, so as to drain the water well from their under support and permit the use of a good depth of ballast; and in order to provide for this there must be room for ballast material between the ditch and the ends of the ties. On such lines as these there has been a very noticeable improvement in track construction, and this improvement is still in progress.

So far as ballast is concerned, gravel is still the universal material, as it probably always will be, for this purpose. Broken stone is used in larger quantities than formerly, but probably not in greater proportion to that of gravel. Wherever gravel of desirable quality is convenient to a railroad it is undoubtedly the most economical material for supporting and maintaining track. If one was to consider improvements in track maintenance, he would have to include some mention of the improved cars for handling ballast, but so far as the work of ballasting is concerned, there have been no improvements within the period considered, or within the past half century, for that matter. The shovel and the tamping bar are still the implements for this work.

We are still using the same kind of ties that were in service 25 years ago. Metal ties and combination ties of concrete and steel construction have been experimented with, but as yet, in this country, there is no considerable mileage of track built with either of these kinds. So far as the future is concerned, the use of concrete and steel combined seems more promising than the use of iron or steel alone. Notwithstanding that forestry experts have for the past 15 or 18 years been warning railroad companies of the vanishing supply of timber, the wooden tie is still the universal standard in this country. So far as the quality of the timber is concerned, there has been a retrogression rather than an improvement. All things considered, oak is the most desirable timber available in this country for railway cross ties, but the proportion of oak ties to the whole number used is much smaller than it was 25 years ago—probably not more than a quarter or one-third as large as it then was. Use is now being made of many kinds of timber that 25 years ago were considered out of the market for railroad ties. Among these, pine—both yellow pine in the South and mountain pine in the West and Southwest—are now very generally used, and late years this material has been finding its way into the Mississippi valley north of the Ohio river. White cedar, also, is now being very largely used. This is a desirable material so far as failure by decay is concerned, but so soft that when used without special means of protection, is soon cut out under heavy traffic. Mention might be made of several other kinds of inferior timber used rather miscellaneously.

The gradual decrease of what was formerly considered the standard timbers has compelled railroad managements to accept ties of several kinds of inferior wood in order to maintain an available supply. The enforced use of soft-wood ties called for some means of protection against rail cutting, and tie plates, which are now very commonly used, are a distinct improvement which the changed conditions of timber supply and weight of rolling stock have brought about. Although the tie plate is useful in more ways than that of protecting the timber from cutting, still the conditions which make its use imperative, or at least expedient, is the wearing effect of the rails on the ties under heavy traffic.

For the past fifteen or twenty years there has been slow but gradual progress in the treating of ties to resist decay. The first plant to be erected for this purpose, in this country, for the treatment of any considerable number of ties, was that of the Atchinson, Topeka & Santa Fe Ry., at Las Vegas, N. M., in 1885. This was fol-

lowed by another plant erected in Chicago a few years later. Both of these plants are still in operation, the latter by the Chicago Tie-Preserving Co.; and in addition to these there are some eight or ten others erected within the past five years. All of these plants are located west of the Allegheny mountains, and all except three west of the Mississippi river.

There is now no question as to the economy of the chemical treatment of ties, and the zinc chloride or zinc tannin (Wellhouse) process is the only one thus far to be adopted on any considerable scale. So far as the present outlook is concerned the preservation of ties by chemical treatment is destined to delay the general use of metal ties, if the results possible from the use of the same do not reduce the demand on the forests that a sufficient supply of timber will be available indefinitely.

The railway rail has been much discussed and written about, but the type has not changed since the early days of railroading. In the quality of the material, in progress and rapidity of manufacture, and in minute details of design there has been important progress during the past quarter century. It might also be said that this period has been coincident with the life of the steel rail, for before the beginning of this period iron rails were very largely in service, and it was only about ten years before then (or in 1867) that the first steel rail was rolled in the United States; and only a few years before that when they began to be used extensively.

The quality of the metal and the method of heat treatment in rolling the same into rails have been very carefully studied; but for all this there are many railway engineers of long and studious practice who claim that the wearing qualities of rails rolled twenty years ago were much superior to those of the present time. Of course, the conditions now are different, for both car-wheel loads and locomotive-driver loads have been doubled within the time referred to. In the early days of steel rails, hand labor was largely employed at the mills, but now all this has been supplanted by modern machinery, and in the increased output of the mills has enabled a very large reduction in the price of steel rails. Of course, it is only trite to say that the steel rail has gradually increased in weight within the period considered. Twenty-five years ago 50-pound rails were in service all over the country, but with the increase in weight of locomotives and cars there has been a necessary increase in the size of rail section, so that 100-pound rails are now very commonly in service.

Aside from the use of Bessemer steel in rail manufacture, what was perhaps the most distinct advance was the recommendation by the American Society of Civil Engineers of a standard shape of rail section for rails of different weight per yard. This recommendation came in the form of the adoption of a committee report of that society fourteen years ago, and at the present time at least seventy-five per cent, and probably more, of the rails that are being rolled are patterned after these sections. While, to an ordinary observer, the standard section of the present day would not appear greatly different from those of the former time, the maintenance of way engineer nevertheless understands that an enormous amount of energy has been expended on the finer points of the design of rail sections. To enumerate briefly, these points cover the proportion of metal in the base, web and head of rail; the radius of the top of the rail section, and particularly the radius of the top corners of the section; and rails with side-sloping heads have gone pretty nearly out of use, in deference to the head with vertical sides.

The twenty-five years considered will cover the extensive use of angle bars for splicing rails at joints. The angle bar was a great improvement over the fish-plate and the chair connection at the joints, and it is still the universal standard joint device. There are, however, a few patented joint splices brought out within the last ten or a dozen years, which are making good progress, and are clearly conceded to be superior to the angle bar under modern traffic conditions. The spike fastening between the rail and the tie is still the universal standard in this country, as it was sixty years ago. There has hardly been any attempt at improvement in this detail. Steel is used to some extent in place of wrought iron for spikes, but the shape has remained practically unchanged, except perhaps for some patented improvement in the design of the point, of which there are several; but still the plain wedge-pointed, hook-headed spike is the typical fastening of this class.

In switches, frogs, switchstands and other devices used in and about turnouts the progress has been more striking than it has in plain track construction. Less than twenty-five years ago there was some doubt in the minds of some maintenance of way officials as to whether a point switch was superior to a stub switch, but the gradual increase of wheel loads has settled this. It is not too much to say that the heavy traffic handled these days over some of our railroads would require a fair-sized crew on each section a good share of the time to keep the head blocks to surface, if stub switches were still being used. In order to make the point switch safe it has been necessary to reinforce the split rails with bars of wrought material; and the adjustment of the connection between the switch and the stand is either designed on finer lines or else more carefully inspected and looked after then was necessarily the case when stub switches were in general use.

The development in the design of frogs has been hardly less important. The spring-rail frog, with reinforcing bars, hold-downs, anti-creeping devices and other improvements to make it safe, has taken the place of the rigid frog on nearly all the heavy-traffic lines, and is fast superseding it elsewhere. If one will take the pains to read the proceedings of the Roadmasters' Association of America some fifteen years ago he will not fail to find discussion divided as to the merits of spring-rail frogs, but the changing conditions have enforced upon track engineers such improvements in the line indicated as now make the spring-rail frog decidedly more economical than the rigid frog.

The extensive installation of interlocking plants at grade crossings, at junction points and for operating a

numerous layout of switches on main line, has worked decided improvements in the design of switches and crossovers. The adjustment of the parts of these devices is now necessarily finer, and the fastenings more secure than was thought to be required before interlocking became so commonly applied. To go into details of the connection of switches with hand-operated interlocking plants, commonly known as "mechanical plants," or into machinery for operating switches at power interlocking plants, would necessarily transgress the ground of another department of maintenance of way. Improvement in this line has gone so far that machines for operating switches at terminals and other points where numerous switches are located in the same vicinity are now being worked by compressed air, by electricity, and by a combination of the two.

Elevation of Traveling Cranes with Jacks

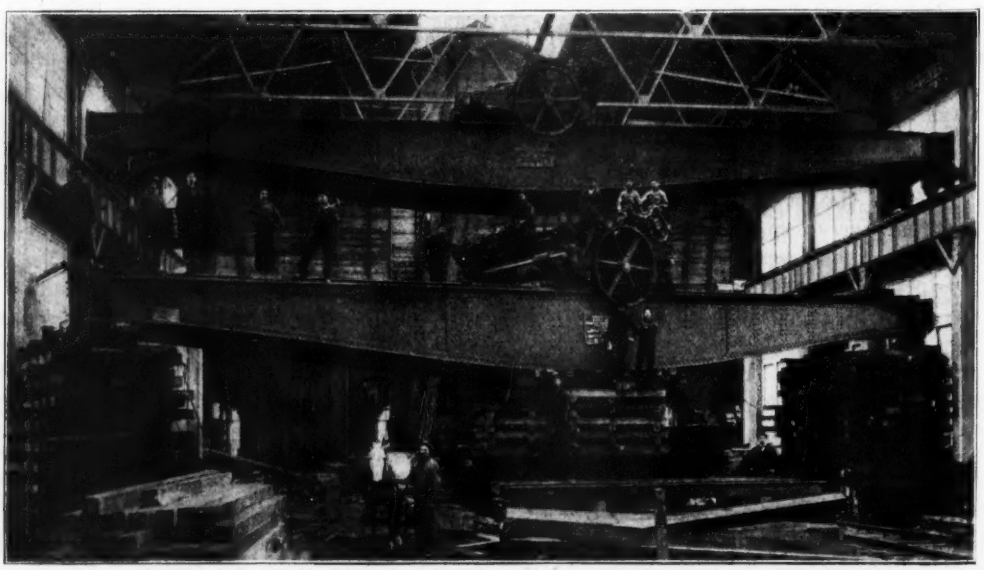
ILLUSTRATED herewith is a novel method of elevating heavy cranes into position upon their supporting girders, which is interesting at this time. The cranes were put into commission several years ago, to serve the machine and erecting floors of the Fort Wayne Shops of the Pennsylvania Lines West of Pittsburg. The work of elevating them was undertaken and successfully accomplished by Mr. W. H. Roney, a civil and contracting engineer of Chicago, to whom we are indebted for the accompanying illustrations. Rather than go to the expense of purchasing necessary tackle equipment for swinging the cranes, it was decided to raise them with jacks, sufficient timber being on hand to supply the necessary blocking.

The crane girders were run into the shop on flat cars and left standing in such a position that they were parallel with the length of the shop. In order to remove the girders from the car, a pile of blocking was arranged near the car at such height that skids could be supported on the blocking and car respectively, and each girder was slid individually from the car to the pile of blocking. The individual girders were then jacked up and placed on a temporary wooden carriage resting upon the original blocking, in which position they were assembled. The parts of the motor trolley were then assembled and placed in position upon the girders forming the traveler.

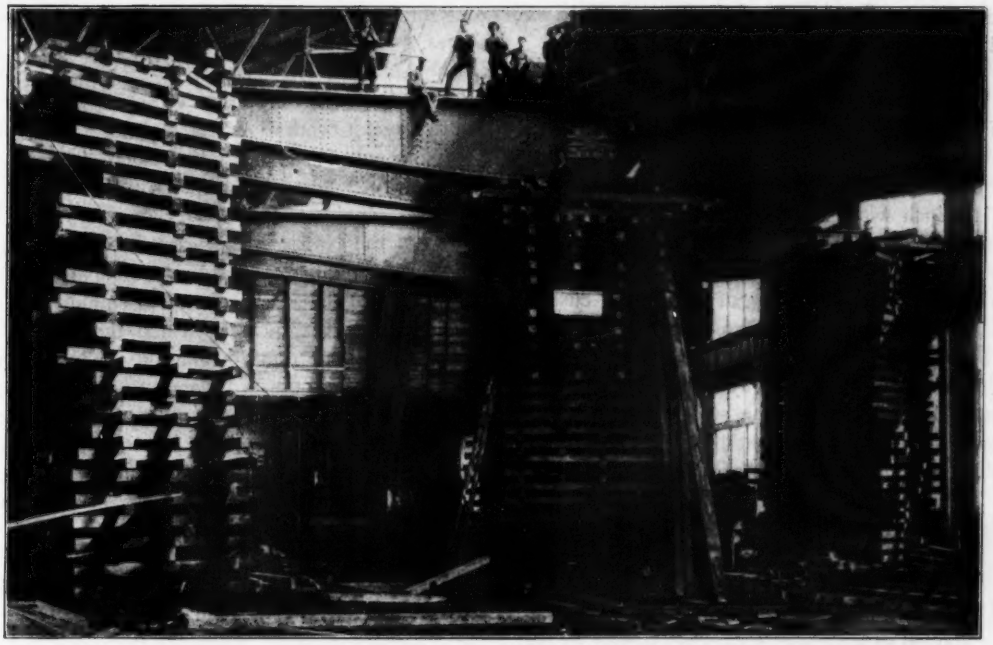
Beneath the temporary wooden carriage a wrought iron ring, 12 ft. 10 ins. in diameter, was placed, several iron plates being arranged upon the ring, and well greased, so that the carriage might be partially revolved to such a position that when elevated, the corners of the crane would just clear the runway girders.

In this position blocking was arranged under each end of the crane and by means of jacks and the continual addition of blocks, the crane was elevated to a height sufficient to reach the runway girders. During the elevation of the crane, the center pile of blocking, shown in accompanying illustrations, was built up as the elevation of the crane permitted. Upon reaching the height of runway girders, the weight of the crane was again allowed to rest upon the center pile of blocking and the crane then revolved to a position in which it could be lowered upon the trucks. When the weight of the crane was finally placed upon the trucks it was found that the elasticity in the blocking was such that it was necessary to jack up the crane a distance of 12 inches in order to remove the blocking.

The cranes were manufactured by the Morgan Engineering Co., Alliance, Ohio. Each crane has a lifting capacity of 75 tons and is supplied with two auxiliary lifts of 10 tons each. The weight of each crane is 126 tons; distance between centers of runway is 76 feet; there are five motors on the motor trolley, the limits of travel of which is such that material may be lifted at a point 8 feet from either wall.



ELEVATION OF TRAVELING CRANES WITH JACKS AT THE FORT WAYNE SHOPS OF THE PENNSYLVANIA LINES.



ELEVATION OF TRAVELING CRANES WITH JACKS AT THE FORT WAYNE SHOPS OF THE PENNSYLVANIA LINES.

New Design of Buhrer Steel Tie

EXPERIMENTS have been made by the Lake Shore & Michigan Southern Railway during the past six years with steel ties. The ties used in this connection are from designs of Mr. C. Buhrer, roadmaster of the Lake Shore at Sandusky, Ohio, and past president of the Roadmasters' and Maintenance of Way Association.

The first steel ties used in these experiments are of modified I-beam section, consisting of a 5-inch I-beam with plates 4 inches and 8 inches wide riveted thereto for top and bottom faces. These ties have been in service already a length of time nearly equal to the average life of an oak tie and show no signs of material deterioration from corrosion or other causes, and they are still giving good service.

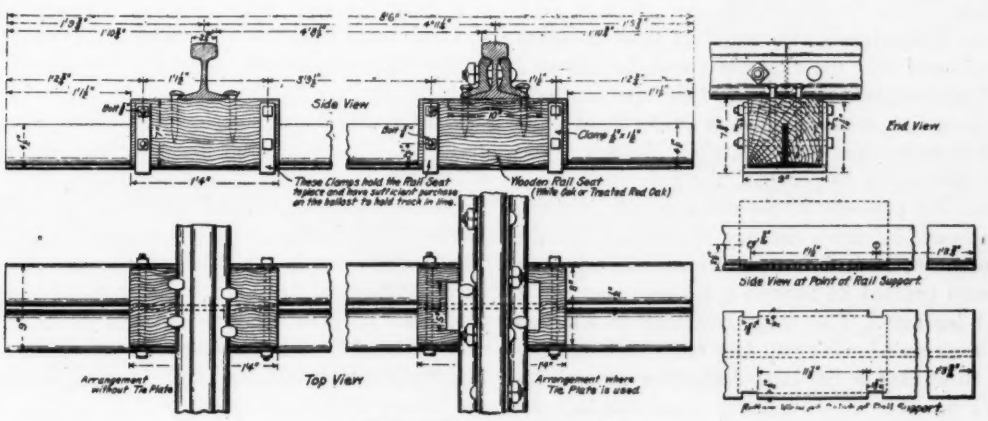
The second type of steel tie used in pursuing these experiments, was made by riveting a plate to the head of an old 65-pound rail and so placing it that this plate formed the bottom face of the tie.

The intention had been to make these ties by re-rolling old rails, but at the time that the second experiment was started the rolling mills were so busy that they would not undertake to roll the desired ties either from old rails or new material.

Experiments with a number of pieces of track laid with steel ties led to the belief that the support is too rigid when the ground is frozen. This conclusion was reached after a number of rails had broken on track laid with steel ties. At the same time, however, a number of rails broke on adjoining sections, laid with wooden ties, and indicating that the rails were of poor quality. Still, it was thought that the tendency to breakage of rails was greater with the steel ties.

This experience, together with the necessity of insulating the rails to provide for block signal service, led to the abandonment of the original type of steel ties used.

However, Mr. Buhrer has continued to experiment and to give his attention to the design of steel ties, until, after several modifications, he has produced a tie which


Side View
End View
Side View at Point of Rail Support
Top View
Arrangement without Tie Plate
Arrangement where Tie Plate is used
Wooden Rail Seat (White Oak or Treated Red Oak)

NEW DESIGN OF BUHRER STEEL TIE.

it is believed will overcome the difficulties formerly experienced and will provide for present requirements.

At the convention of the Roadmasters' and Maintenance of Way Association held in Chicago during the month of November, Mr. Buhrer exhibited a tie which had been in service several years. The section of this tie is that of a modified I-beam, 5½ inches high, in which the bulb is 1 inch wide, the base 8 inches wide and the web ¼-inch thick.

With ties of this type the rails are carried on blocks which fulfill the double purpose of forming a cushion for the rails and for insulating them from the ties. Each block is bound by U-clamps passing under the web of the tie, the ends being clamped by a ⅝-inch bolt passing through the block above the steel tie. The block is held securely by bent straps at the outer end of the block, bolted securely to the web of the tie by a ¾-inch bolt.

The most recent modification in the design of Mr. Buhrer's steel tie is illustrated by the accompanying line drawing. This tie is an inverted T-iron, either re-rolled from old rails or rolled from new metal, and wooden blocks are applied in a manner somewhat similar to that described in connection with the previous design. The tie is 4½ inches high, with a base 9 inches wide and the web is ½ inch thick. To secure the wooden block to the tie and prevent its splitting from spikes being driven into the wood, each block is bound by two U-clamps passing under the tie, and clamped by two ⅝-inch bolts, one of which passes through the web of the steel tie. Each block is 16 inches long, 8 inches wide and 7 inches high. Rails are carried on these blocks and spiked to them in a manner similar to that attending the usual form of wooden tie.

Recent Increase in Wages

WITHIN a month practically every important railroad system and the largest of the industrial corporations have declared increases in the wages of employes. The Pennsylvania Railroad took the lead voluntarily. Its 185,000 employes east and west of Pittsburgh in December received a million dollars more than they did in November as the result of the recent 10 per cent advance.

When the Pennsylvania announced its raise in wages it was predictetd that the example would be followed by other large employers of labor. One after another, in quick succession, a dozen or more corporations gave the glad tidings to their employes. The Reading made a general advance of 10 per cent, the Erie conceded a milage basis for payment of engineers on all divisions, the Lackawanna increased the pay of employes in the traffic department from 8 to 20 per cent, and the New York Central granted its firemen a ten-hour day and a substantial increase. The roads centering in Chicago increased their switchman's pay four cents an hour. The Chicago, Milwaukee & St. Paul declared a general advnce of 14 per cent for switchmen, 7 and one-half per cent for firemen and 10 per cent for all other road employes.

The Standard Oil Company has increased the pay of its refinery employes 5 and 6 per cent. The United States Steel Corporation has allowed 70,000 of its laborers an advance of 10 cents a day. About 11,000 employes of the American Express Company get a raise of 10 per cent, a total of $700,000 a year, and 4,000 employes of the National Express Company get a similar raise. The Amalgamated Copper Company has declared an advance in the wages of 15,000 employes.

The 7 per cent increase which the anthracite mine workers received on November's production was the culmination of an upward wage movement which began with 1 per cent in July and reached 4 per cent in October. Between June and October the eight principal anthracite producers paid out in wages about $1,250,000 more than the miners would have received according to the June scale. More than 150,000 anthracite mine workers have benefited by the operation of the sliding scale established by the anthracite strike commission.

One calculator has figured that the total increases in the wages of railroad employes this year will amount to $82,000,000 annually, or nearly 4 per cent of the gross earnings of all the railroads combined in 1905. Another estimate puts the total increases that the railroads will grant to their employes at $100,000,000. The increase on the Pennsylvania System alone amounts to about one-eighth of that sum.

A comparison between the number of men employed on the Pennsylvania Lines east of Pittsburgh and Erie, September 30, 1901, and the number employed September 30, 1906, shows that the wages increased by a greater percentage than did the employes. In five years the total sum paid to employes increased 59 per cent, while the number of employes increased but 38 per cent. The following table shows the increases:

LINES EAST OF PITTSBURG AND ERIE.

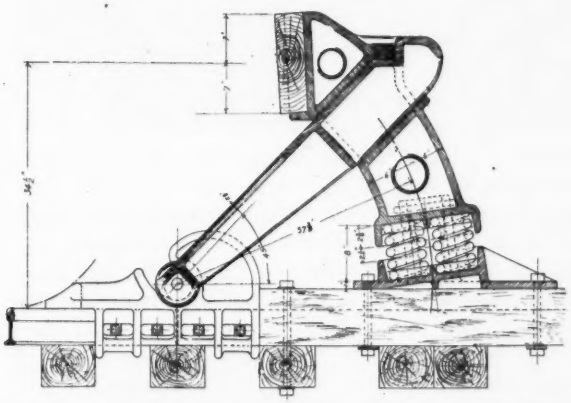
Total number employes Sept. 30, 1901	97,324
Total number employes Sept. 30, 1906	134,041
Increase (38 per cent)	36,717
Amount paid to employes per month, Sept. 30, 1901	$4,489,422
Amount paid to employes per month Sept. 30, 1906	$7,125,017
Increase (59 per cent)	$2,635,595

These figures are for September 30th and, therefore, do not take account of the recent 10 per cent advance declared by the Pennsylvania. On the eastern lines 125,440 employes are affected by the advance and the increase on the pay-roll for the year amounts to nearly $8,500,000.

On the lines west, about 60,000 men are affected, the increases amounting to about $3,500,000. Thus the whole Pennsylvania Railroad system has declared an extra dividend of $12,000,000 a year to its 185,000 employes—in itself probably the greatest dividend to labor ever declared by a single corporate interest and initiating the most remarkable wage increase movement in the history of this country.

Cast Steel Bumping Post

A NEW bumping post made of steel and known as the Invictus Bumping Post, has recently been placed on the market. This post was designed with the view of absorbing, as far as possible, the injurious and destructive shocks to cars, their draft gear, as well as to the post, resulting from rough switching service. The details of construction and the principal features of interest in the design of this post are illustrated by the accompanying line drawing which are reproduced through the courtesy of Mr. W. E. Symons, president of the Pioneer Steel Truck Company, the manufacturers of this device.



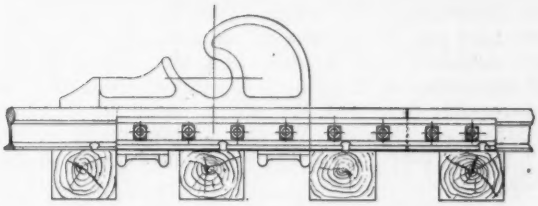
APPLICATION AT RAIL JOINT, ELIMINATING ANGLE BARS—CAST STEEL BUMPING POST.

This post is designed either for permanent or temporary use in a given location. The features in the construction of this post which provide for its being portable are designed with the view to its application without making any change whatever in the standard track construction. When in temporary service the rail brackets are set to abut against the regular angle bars and it is necessary to bore one hole in each rail. When located permanently the rail brackets displace the outside angle bars.

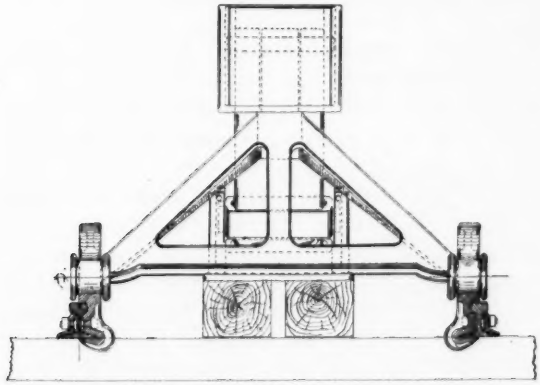
To provide for a range of application from 60 to 95 lbs. rail section, an adjustable rail bracket has been designed and in applying this bracket to a rail section less than 95 lbs., a shim is inserted between the base of the rail and the bracket, one the upper side of the rail base.

The accompanying illustrations show an application of hellical springs for absorbing shocks. However, the friction draft gears in general use on cars and engine tenders can be readily applied to this post if this should be desired instead of hellical springs.

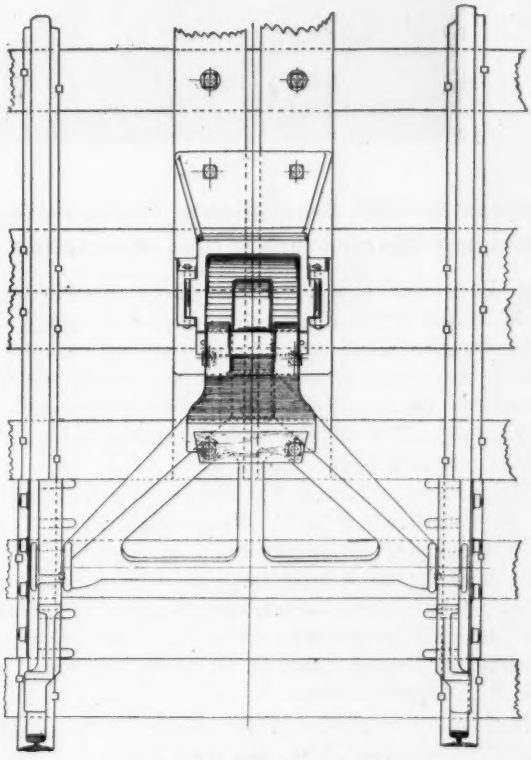
It would be difficult to estimate in dollars and cents the amount of money a device of this kind would save in any fixed period of time, as the items of expense resulting from these causes are hidden in the expense of freight car maintenance, and that of the claim department in satisfaction for claims of damaged shipments, such as stoves, pianos, glassware, china, crockery and other fragile material.



APPLICATION OF BRACKET TO RAIL BUTTING AGAINST ANGLE BAR—CAST STEEL BUMPING POST.



ELEVATION—CAST STEEL BUMPING POST.



PLAN—CAST STEEL BUMPING POST.

Concrete Bridge Over Big Creek

THE use of concrete in railroad construction has brought out many graceful structures, and in this connection it is interesting to mention the bridge over Big Creek on the Big Four Railway, a notable example of strength combined with symmetry.

The bridge is on the main line of the Big Four Railway, 14 miles south of Paris, Illinois. It will be seen from the accompanying illustration that the bridge is supported by 3 graceful lower arches over which 26 Spandrel arches are built. The total length of the bridge and abutments is 355 feet; the main lower arch being 100 feet and two outside arches 80 feet span. The height above foundation is 91 feet. The main piers are set on foundations 34 feet deep and 42 feet wide.

In constructing the bridge 15,000 barrels of cement were used and 26,500 tons of concrete. Eight months were employed in construction at a total cost of bridge and approaches of $150,000. The Collier Bridge Co. of Indianapolis, Ind., built the bridge under the direction of Mr. W. L. Taylor. We are indebted to Mr. C. E. Jay, photographer, Paris, Ill., for the photograph of this bridge.

CONCRETE BRIDGE OVER BIG CREEK.—C. C. C & ST. L. RY.

Subjects for 1907 Convention of the Roadmasters and Maintenance of Way Association

AT A RECENT meeting of the executive committee of the Roadmasters' and Maintenance of Way Association, subjects were selectetd for committee reports and papers to be presented at the next annual convention which will be held in Chicago, November 12-14, 1907. The subjects, with the committeemen appointed, are as follows:

Maintenance of Line and Surface in Winter Time.—C. H. Cornell, C. & N. W. Ry., Antigo, Wis.; P. J. Mungaven, Northern Pacific Ry., West Superior, Wis.; John Shea, Duluth & Iron Range R. R., Two Harbors, Minn.; John Collins, Minneapolis, St. Paul and Sault Ste. Marie Ry., Rhinelander, Wis.; T. Hickey, Michigan Central, St. Thomas, Ont.; W. P. Murn, Northern Pacific Ry., Glendive, Mont.

Methods of Destroying Vegetation in Track, including Weed Burners.—J. W. Guffey, A., T. & S. F. Ry., Arkansas City, Kans.; E. W. Phelan, C., M. & St. P. Ry., Milbank, S. Dak.; A. B. McKinley, C., B. & Q. Ry., Brookfield, Mo.; David Wright, Soo Line, Minneapolis, Minn.; Henry Ware, B., R. & P. Ry., Springville, N. Y.; Chas. Yoder, L. S. & M. S. Ry., Ashtabula, Ohio.

Wrecking Outfits, Organization and Working.—C. Buhrer, L. S. & M. S. Ry., Sandusky, Ohio; F. J. Allen, C., B. & Q. Ry., Burlington, Iowa; W. H. Kofmehl, C., M. & St. P. Ry., Elgin, Ill.; J. L. Culveyhouse, A., T. & S. F. Ry., Barstow, Cal.; Andrew Boydston, A., T. & S. F. Ry., Chillicothe, Ill.; Daniel Foley, Mich. Cent. Ry., Jackson, Mich.; B. A. West, A., T. & S. F. Ry., Pueblo, Colo.

Cost of Ballasting Old Track and Renewing Ties.—A. E. Hanson, C. & N. W. Ry., Green Bay, Wis.; J. W. Guffey, A., T. & S. F. Ry., Arkansas City, Kan.; John Kennedy, B. & O. R. R., Glover Gap, W. Va.; C. Buhrer, L. S. & M. S. Ry., Sandusky, O.; J. R. Kimbrough, C., B. & Q. Ry., Villisca, Ia.; M. Lumm, Wabash Ry., Montpelier, O.; T. W. Spencer, C. & N. W. Ry., Eagle Grove, Ia.; W. Shea, C., M. & St. P. Ry., Blakesburg, Ia.

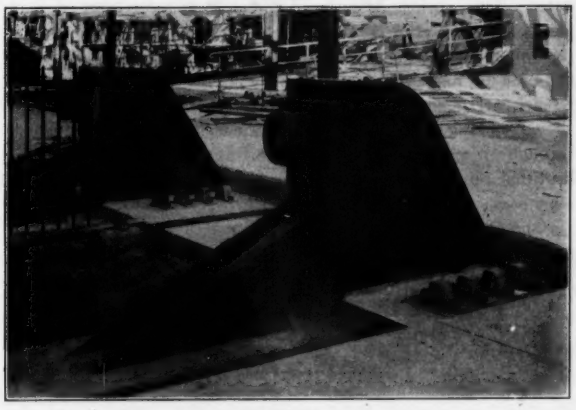
Cost of Relaying Rail, Organization and Working.—John Kennedy, B. & O. R. R., Glover Gap, W. Va.; A. M. Clough, New York Central R. R., Batavia, N. Y.; A. Birdsall, C. & N. W. Ry., Antigo, Wis.; J. W. McManama, Boston & Maine R. R., Waltham, Mass.; A. A. Read, Lehigh Valley R. R., Hazelton, Pa.; J. O'Laughlin, Ann Arbor R. R., Owosso, Mich.

Paper—"The Oiling of Roadbed," by J. C. Rockhold, Santa Fe Coast Lines, Los Angeles, Cal.

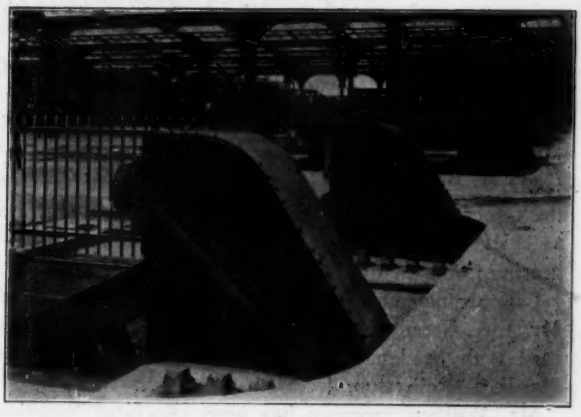
Paper—"Spcial Construction on the Cincinnati Southern Ry.," by C. J. Murphy, Southern Ry., Princeton, Ind.

Paper—"Why Efficient Track Work is Skilled Labor," by W. M. Camp, Chicago.

The following topical questions for discussion are also announced.—"Paving of Ditches;" "Length and Size of Ties;" "How to Drain the Midway of Double Track; Whether by Surface Ditches or by Tile Drains;" "Should the Gage of Curves be Readjusted for Wear to the Side of the Rail Head, and by Moving Which Rail?" "Quality of Track Labor."



STEEL BUMPING POST, HOFOKEN TERMINAL.—D. L. & W R. R.



STEEL BUMPING FOST, HOBOKEN TERMINAL—D, L. & W, R. R.

New Bumping Post, Hoboken Terminal of the D. L. & W. R. R.

IN THE reconstruction of the Delaware, Lackawanna & Western passenger terminal at Hoboken, a new bumping post has been used which is illustrated herewith by photographs and drawings, through the courtesy of the *Railroad Gazette*. It is built entirely of structural steel shapes and rests on a concrete bed to which it is securely anchored by twenty 1½-inch bolts. The bottom ties are 15-in. 55-lb. channels about 15ft. 6 in. long bedded in concrete laid over the foundation. These provide a stable base, and the upright bracket which carries the rubber bumper block is strongly reinforced with stiffening angles in the direction of the resultant forces under impact. These bumping posts have not as yet been subjected to actual emergency tests, although they have been in place for some time, but it is believed that they will prove unquestionably efficient.

Personal

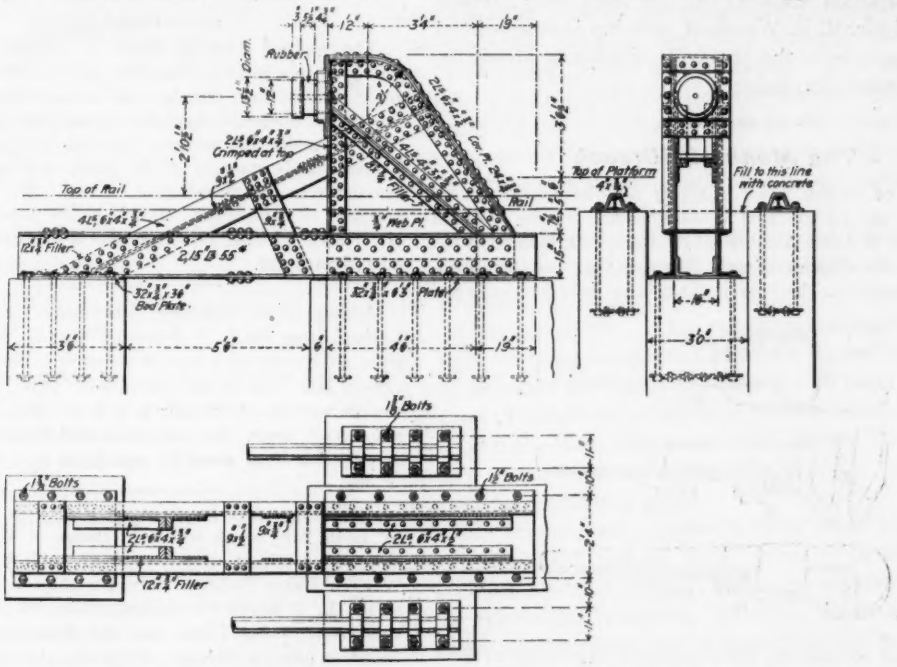
The headquarters of Mr. J. D. Isaacs, consulting engineer of the Harriman Lines, have been removed from San Francisco, Cal., to Chicago.

Mr. John V. Hanna, assistant engineer of maintenance of way of the St. Louis & San Francisco, at St. Louis, Mo., has been appointed chief engineer of the Kansas City Terminal Railway, of Kansas City, Mo.

Mr. C. J. Kelloway, heretofore supervisor of interlocking of the Delaware, Lackawanna and Western, has been appointed signal engineeer of the Atlantic Coast Line, with office at Wilmington, N. C.

Mr. J. B. Hardy has been appointed roadmaster of the Wharton district of the Galveston, Harrisburg & San Antonio, with headquarters at Wharton, Tex., to succeed Mr. Hardy, acting roadmaster.

Mr. W. F. Carlisle has been appointed engineer of



DETAILS OF STEEL BUMPING POST IN HOBOKEN TERMINAL OF D. L. & W. R. R.

maintenance of way of the Norfolk & Southern, with office at Newbern, N. C.

Mr. W. F. Milner has been appointed engineer of maintenance of way and structures of the Macon, Dublin & Savannah, with office at Macon, Ga., in place of Mr. W. C. Curd, resigned.

Mr. J. P. Gaffney has resigned as chief engineer of the George's Creek & Cumberland to accept a position as chief engineer of the General Contracting & Engineering Company of New York.

Official announcement is made of the appointment of Mr. J. A. Green as chief engineer of the Montana Railroad with headquarters at Helena, Mont., succeeding Mr. F. T. Robertson, deceased.

Mr. William Sweeney has been appointed superintendent of bridges and buildings of the Northern Wisconsin and Lake Shore divisions of the Chicago & Northwestern, with office at North Fond du Lac, Wis.

Mr. H. A. Roberts has been appointed division engineer of the Oregon Short Line at Pocatello, Idaho, to succeed Mr. R. B. Ketchum, who has accepted the position of chief engineer of the Independent Coal & Coke Company at Helper, Utah.

Mr. D. Brady has been appointed roadmaster of the Hoxie district and Hunter branch of the St. Louis & San Francisco at Cape Girardeau, Mo., to succeed Mr. J. E. Kelly, who has beeen transferred to St. Genevieve, Mo., as roadmaster of the St. Louis district from Southeastern Junction to Cape Girardeau, succeeding Mr. Herman Hall, assigned to other duties.

Mr. L. P. Baker has beeen appointed division engineer of the Mahoning division of the Erie Railroad at Youngstown, O., vice Mr. W. M. Dawley, assigned to other duties. Mr. A. E. Jamison has been appointed assistant division engineer of the Mahoning division in place of Mr. R. E. Woodruff, who has been appointed division engineer of the Meadville division at Meadville, Pa., to succeed Mr. Baker.

The Monarch Wreuch

A form of wrench which is giving considerable satisfaction for uses in the railway field is manufactured by the Monarch Wrench Co., St. Louis, Mo. One of the types manufactured by the company is the alligator wrench, shown in Fig. 1 of the accompanying illustration. The jaws in this type are interchangeable and

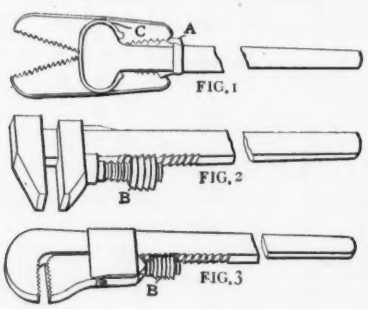


FIG. 1

FIG. 2

FIG. 3

reversible, an arrangement which permits a large range of work. By means of a spring the performance of work is greatly facilitated. This spring engages in either jaw by means of bent points, thus exerting a tendency to keep the jaws in normal relation to each other to an extent which adds considerably to the ease of handling in working. Fig. 2 represents a monkey wrench arranged on a similar plan to that of the Stilson type shown in Fig. 3. This type is capable of rapid adjustment through an arrangement of the adjusting screw, by which it can be lifted out of contact with the rack and moved along, snapping back into adjustment again on being released.

One of the main features of the Monarch wrench is the automatic instantaneous adjustment, which does away with the many vexatious troubles and delays which usually attend the use of the nut and screw wrenches. These wrenches are drop forged from selected steel and case hardened, and are interchangeable in all parts.

The Detroit Graphite Manufacturing Co., Detroit, Mich., is sending out a neat little pamphlet calling attention to the "Superior Graphite Paint," and "D. G. M." paints manufactured by the company. The pamphlet contains half-tone illustrations of various places where these products have been used. Graphite paint is a well-known preventive of rust and the company's

"Superior Graphite Paint" is standard on many large railroads for painting bridges, viaducts, and other places subject to the sulphur fumes, cinders and steam from locomotives. The company manufactures a full line of station paints, freight car paints, special paints for trucks, car roofs, locomotive cab roofs, underframes, coal space for tenders, hand rails, signal and interlocking apparatus, and special steel car colors.

The Refined Iron & Steel Co., Pittsburg, Pa., recently placed its new plant in operation for the manufacture of high-grade puddled iron, for the various uses to which iron is put. One of the company's specialties is staybolt iron, which is manufactured under the process invented by Mr. William Stubblefine, who is manager of the plant, and has had many years experience in the manufacture of iron. Mr. J. C. De Noon is president of the company, Mr. I. N. De Noon is treasurer, and Mr. Henry F. Gilg, secretary, the latter having charge of the sales department.

A copy of the Vicksburg American of recent date has been received from the L. S. Starrett Company, Athol, Mass., which gives an account of a test of the steel in the cages of the new County jail. One of the "tool proof" steel bars of over 1 inch section was sawed through in 4 hours with a 12 inch Starrett saw. As a result the contractors will have to supply a grade of steel that must prove its superiority over this make of saws.

A Chicago office has been established by Adreon & Co., of St. Louis, Mo., which will be in charge of Mr. Edw. W. Hodgkins, vice-president of the company, with headquarters at 208 Western Union Building. Mr. Hodgkins is also vice-president of the L. J. Bordo Co., manufacturers of the Bordo blow-off valves and swing joints, and the latter company has established an office in Chicago, which will also be under the charge of Mr. Hodgkins.